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K. Coffey/A. Moline

In re application of : DONALDSON COMPANY, INC.
Application Serial No : PCT/US2003/02799
Filed : 31 January 2003 (31.01.2003)
Agent Ref. : 758.1491WOU1
Title : FLUTED FILTER MEDIUM AND PROCESS FOR ITS
MANUFACTURE
Due Date : 13 July 2004 (13.07.2004)

RESPONSE TO WRITTEN OPINION

International Examining Authority
European Patent Office
P.O. 5818
Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
NETHERLANDS

Dear Sir:

The Written Opinion has been received and reviewed. Applicant notes that the Examination Authority has recognized that each of the claims is novel. The Examination Authority, however, has stated that it is not evident what technical advantages or unforeseen effect results from the present folding, and that no inventive step is recognized at the moment. The Examination Authority requested Applicant to explain advantages and why they would not be expected from Reference D1 (JP 1-171615).

Attention is directed to the disclosure, as seen in the published PCT Document WO 2004/00704. Beginning at the last paragraph, page 12, the disclosure sets forth some of the problems associated with Z-filter constructions relating to the closing of individual flute ends. The disclosure sets forth at least two problems that need addressing: (1) high quality seals at the location of the closed flute ends are critical to proper operation of the media structure that results (first paragraph of page 13); and (2) restriction to fluid flow is created by the relatively large impermeable surface area to fluid flow represented by the sealant areas generally positioned perpendicular to flow through the media pack (first paragraph of page 13).

To address the first problem, Applicant's disclosure describes using a particular type of fold arrangement, and pressure from the fold, to ensure a reliable, high quality seal. Reference D1 does not describe how to achieve a reliable, high quality seal. In reference D1, FIG. 1 shows sealant being applied between the flat sheet 2 and the narrow media edge 4e. In

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D1, there is no assurance of achieving a reliable, high quality seal (absent pin hole leaks) at the interface between the flat sheet and media edge 4e. Applicant's arrangement, in contrast, has the assurance of the claimed fold arrangement and pressure applied to the fold to achieve a reliable, high quality seal.

To address the second problem (the problem of restriction increasing due to sealant), as explained on page 15 of Applicant's disclosure, the inventors have determined that it is preferred to generate a regular fold pattern to collapse the corrugation (flute) toward the flat sheet and to reduce the sealant area at or near the flute ends. The term "regular fold pattern" is explained to mean that selected corrugated (flute) ends that are modified are folded into a regular and repeated pattern, as opposed to being merely crushed toward the flat sheet. One example of a regular fold pattern is illustrated in FIG. 15. A pattern of fold steps that accomplishes this is discussed in connection with FIGS. 7 - 24 and FIGS. 28 - 47.

Applicant's disclosure discusses some of the approaches taken in the prior art. One approach discussed is the approach shown by Yamada et al., U.S. Patent No. 5,562,825. Yamada et al. addressed the issue by flattening the two media sheets together into a parallel configuration. In the assignee's previous work, WO 97/40918, the problem was addressed by crushing along a sealant bead and then slitting. A different type of crushing of flutes was shown in U.K. 703,823, published February 10, 1954.

Page 15, paragraphs 2 and 3, discuss how many of these approaches in the prior art are difficult to achieve if there is also to be achieved continuous line speeds, practical for manufacturing techniques. For example, a consistent, parallel squeeze or configuration such as that shown at the downstream edge in Yamada et al. will be difficult especially with significant line speeds (30 meters per minute or more). As explained in Applicant's disclosure, this is because there is often too much media in the corrugation to line up evenly and parallel with the flat media. As explained on page 15 of Applicant's disclosure, the inventors have determined that it is preferred to generate a regular fold pattern to collapse the corrugation (flute) toward the flat sheet and to reduce the sealant area at or near the flute ends.

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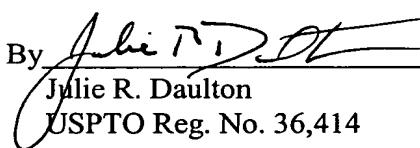
Reference D1 is merely one of the many various prior art approaches to address the second problem--the problem restriction due to sealant. Applicant's disclosure has found a particularly unique solution to this problem. By forming the claimed regular fold arrangement, including at least four folds, a reliable seal that also reduces sealant area is created that allows the media to be processed at continuous line speeds. There is no evidence to suggest that Reference D1 can achieve the seal reliability or continuous processing that is discussed in Applicant's disclosure.

Applicant requests a favorable examination report.

Respectfully submitted,

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By 
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